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Subject: draft of the new governmental regulations on wind turbine noise levels

Your reference: YM002: 01/2014

GENERAL INFORMATION

The ENERCON GmbH, which has been among the top producers of wind energy turbines for 30 years and which has been active in Finland already since 1997, welcomes the opportunity to comment on the draft of the new governmental regulations on wind turbine noise levels.

ENERCON appreciates the clear and simple structure of the draft in general and would like to point out, that we strongly agree and support the approach to equalize the regulations for permanent residential and leisure areas. This change to the Governmental Decree 993/1992 helps to clarify and simplify the planning of wind energy projects in Finland and it puts the concerns of people who live in sparsely populated areas and of those who only spent time in these areas during vacations on the same level.

It is already a very low noise limit (45/40dB > day/night) which is suggested by the Finnish government in comparison to other European countries (e.g. in Germany: 60/45dB in village areas). Immission measurements for limits below 45dB are very difficult to achieve as the background noises are most likely higher. It is almost impossible to differentiate between background and turbine noise in this cases. The 45/40dB limit should already include the 5dB penalty for amplitude modulation in our opinion.

Even though ENERCON does support the presented draft of the new governmental regulations on wind turbine noise levels in general, we would like to point out one topic that endangers the further development of wind energy projects in Finland and therefore urgently needs further clarification and explanation:

- Penalty of 5 dB for an amplitude modulated noise

AMPLITUDE MODULATION

It has to be understood that it is an inherent feature of **all wind turbines** that they generate noise when their blades rotate. The sources of wind turbine noise, can be divided into two categories; mechanical and aerodynamic. The primary sources of mechanical noise are associated with the mechanism of electricity generation i.e. the drive train and the generator; whilst aerodynamic noise is produced by the flow of air over the turbine blades. Aerodynamic noise originates from the flow of air over, under and around the blades and is generally broadband in character. It is directly linked to the movement of the blades through the air and will occur to varying degrees whenever the turbine blades move.

When discussing the Amplitude Modulation topic it becomes clear that there are certain problems that need to be solved before the term can find its way into any legally binding document:

- A general and widely accepted definition of the term Amplitude Modulation in connection to wind turbine noise does not exist. It has not been defined in any national or international noise standard and Amplitude Modulation appears to be a general cover name for various, very rare and not turbine type specific noise which is audible over long distances.
- There is no general and scientifically accepted calculation basis on how Amplitude Modulation from wind turbines should be calculated and evaluated. Even there are different approaches to calculate and judge amplitude modulation from wind turbines which are currently discussed between scientists in different countries. Amplitude modulation is present from any sound/noise emitting structure. So also any wind turbine emits a noise which can be judged as amplitude modulated sound.
- No national or international noise standard is defining which value or intensity of Amplitude Modulation is acceptable and the scientific opinion on this question lie well apart.

If these open topics are not clarified before the new governmental regulations on wind turbine noise levels come into force and the Amplitude Modulation paragraph stays in the regulation as proposed in the draft, these topics have to be clarified in court and leave the Finnish wind energy industry as well as the authorities and the affected residents in a very uncertain and dissatisfying situation. As no national or international standard on this topic has been defined yet we highly recommend that the Finnish government leaves the paragraph on the Amplitude Modulation out of the new regulations and waits until international experts and scientists have defined and accepted a common standard.

As there is no general definition of the term, we will use explanation from RenewableUK for now:

“The sound level of aerodynamic noise from wind turbine blades is not completely steady, but is modulated (fluctuates) in a cycle of increased and then reduced level, sometimes called “blade swish”, typically occurring in step with the angle of rotation of the blades and so being periodic at the rotor’s rotational speed – for typical commercial turbines, this is at a rate of around once or twice per second. This phenomenon is known as Amplitude Modulation of Aerodynamic Noise or more succinctly by the acronym AM.”

Amplitude Modulation is an inherent feature of all wind turbines. With the reduction of the acceptable noise levels to 40 dB at night-time for permanent residential and leisure areas the Finnish government has taken this inherent feature into full

account and follows the standards of other European regulations on wind turbine noise. European regulations on wind turbine noise are generally stated in terms of maximum dB(A) noise levels and make no explicit allowances for AM.

Therefore an additional penalty of 5dB for turbines that generate amplitude modulated noise, and these are basically all turbines, would mean that:

- all wind energy developers have to calculate with a 35 dB noise limit for projects close to permanent residential and leisure areas. The proposed 40 dB limit for these areas would actually be meaningless.
- most of the wind energy projects, which are located close to noise critical areas will end up in court due to the missing regulations regarding calculation, evaluation and acceptable limits for amplitude modulation.
- the Finnish government is putting a double penalty on wind energy projects that are located close to residential areas. With the new draft the noise limit has been reduced from 50 dB to 40 dB during night-time, which is a very huge reduction of the accepted limit. The penalty for Amplitude Modulation, which is an inherent feature of all wind turbines, will reduce the limit further to 35 dB.

Conclusion

Following the above mentioned argumentation and in order to provide planning reliability and stability for everyone involved in the development of wind energy projects (developers, authorities and residents), ENERCON supports the clear and stringent draft of the new governmental regulations on wind turbine noise levels with the exception of the additional penalty of 5 dB for an amplitude modulated noise. As this would mean that the Finnish government is putting a double penalty on wind energy projects that are located close to residential or leisure areas and as it would lead to much more ambiguity and uncertainty rather than clarity, we strongly recommend that the undefined Amplitude Modulation topic will be withdrawn from the draft.



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